THE CLAIMS

What is claimed is:

1. A method for controlling exchange coupling of grains of a magnetic medium, the method comprising:

providing a magnetic medium having magnetic grains; and

irradiating the magnetic medium with ions to induce exchange coupling between grains of the magnetic medium.

2. The method according to claim 1, wherein the ions are selected from the group consisting of H^+, He^+, Ne^+, Ar^+, Kr^+, and Xe^+.

3. The method according to claim 1, further comprising ionizing a gas to create the ions.

4. The method according to claim 1, wherein the ions are selected from the group consisting of Ga^+, Hg^+, and In^+.

5. The method according to claim 1, further comprising generating the ions from a liquid metal ion source.

6. The method according to claim 1, wherein irradiating the magnetic medium irradiates the magnetic medium with ions having an acceleration voltage of between 10 keV and 100 keV.

7. The method according to claim 6, wherein irradiating the magnetic medium irradiates the magnetic medium with ions having an acceleration voltage of between 20 keV and 30 keV.

8. The method according to claim 1, wherein irradiating the magnetic medium irradiates the magnetic medium with ions having an energy that substantially affects an entire thickness of the magnetic medium.

9. The method according to claim 1, wherein the magnetic medium includes granular magnetic particles on a tape.

10. The method according to claim 1, wherein the magnetic medium includes granular magnetic particles on a disk.

11. The method according to claim 1, wherein the magnetic medium has a perpendicular magnetization.

12. The method according to claim 1, wherein the magnetic medium has a longitudinal magnetization.

13. The method according to claim 1, wherein the magnetic medium has a magnetization between a perpendicular magnetization and a longitudinal magnetization.

14. The method according to claim 1, wherein irradiating the magnetic medium includes exposing the magnetic medium to an ion dosage of between 10^{13} ions/cm^2 and 10^{17} ions/cm^2.

15. The method according to claim 1, wherein irradiating the magnetic medium includes exposing the magnetic medium to ions using a non-patterned exposure of the magnetic medium.

16. The method according to claim 1, wherein the irradiating is performed to increase the areal density of magnetic bits that can be recorded on the medium.

17. A magnetic medium formed by irradiating the magnetic medium with ions to induce exchange coupling between grains of the magnetic medium.

18. The magnetic medium according to claim 17, wherein the ions are selected from the group consisting of H^+, He^+, Ne^+, Ar^+, Kr^+, and Xe^+.

19. The magnetic medium according to claim 17, wherein the ions are selected from the group consisting of Ga^+, Hg^+, and In^+.

20. The magnetic medium according to claim 17, wherein the magnetic medium is irradiated with ions having an acceleration voltage of between 10 keV and 100 keV.

21. The magnetic medium according to claim 17, wherein the magnetic medium has been exposed to an ion dosage of between 10^{13} ions/cm^2 and 10^{17} ions/cm^2.

22. The method according to claim 17, wherein an areal density of magnetic bits that can be recorded on the medium is increased by the irradiation of ions.

23. A method, comprising:

providing a magnetic medium having magnetic grains; and

irradiating the magnetic medium with ions, in a non-patterned fashion, to increase an areal density of magnetic bits that can be recorded on the medium.

24. The method according to claim 23, wherein the ions are selected from the group consisting of H^+, He^+, Ne^+, Ar^+, Kr^+, and Xe^+.

25. The method according to claim 23, wherein the ions are selected from the group consisting of Ga^+, Hg^+, and In^+.

26. The method according to claim 23, wherein irradiating the magnetic medium irradiates the magnetic medium with ions having an acceleration voltage of between 10 keV and 100 keV.

27. The method according to claim 26, wherein irradiating the magnetic medium irradiates the magnetic medium with ions having an acceleration voltage of between 20 keV and 30 keV.

28. The method according to claim 23, wherein irradiating the magnetic medium irradiates the magnetic medium with ions having an energy that substantially affects an entire thickness of the magnetic medium.

29. The method according to claim 23, wherein irradiating the magnetic medium includes exposing the magnetic medium to an ion dosage of between 10^{13} ions/cm^2 and 10^{17} ions/cm^2.